What is claimed is:

1. A composite metallic ultrafine particle characterized in that a surface of a core metal produced from a metallic salt, a metallic oxide, or a metallic hydroxide and having a particle diameter of 1 to 100 nm is covered with an organic compound including a functional group having chemisorption capability onto said surface of said core metal.

2. A composite metallic ultrafine particle according to claim 1, characterized in that:

said core metal includes at least one member selected from the group consisting of Ag, Au, Bi, Co, Cu, Cr, Fe, Ge, In, Ir, Ni, Os, Pd, Pt, Rh, Ru, Si, Sn, Ti, and V; and

the amount of organic compound for covering said core metal is 0.01 to 1 molecule, per metal atom on said surface of said core metal.

3. A composite metallic ultrafine particle according to claim 1, characterized in that said organic compound includes an alcoholic hydroxyl group, carboxyl, thiol, amino, or amide group and has four or more carbon atoms.

4. A composite metallic ultrafine particle according to claim 1, characterized in that said metallic salt is carbonate, nitrate, chloride, acetate, formate, citrate, oxalate, urate, phthalate, or a fatty acid salt having four or less carbon atoms.

5. A process for producing composite metallic ultrafine particles, characterized by comprising:

mixing a metallic salt, a metallic oxide, or a metallic hydroxide with an organic compound including a functional group having chemisorption capability onto a surface of a core metal produced from the metallic salt, the metallic oxide, or the metallic hydroxide; and

heating said mixture for reaction.

6. A process for producing composite metallic ultrafine particles according to claim 5, characterized in that:

said core metal includes at least one member selected from the group consisting of Ag, Au, Bi, Co, Cu, Cr, Fe, Ge, In, Ir, Ni, Os, Pd, Pt, Rh, Ru, Si, Sn, Ti, and V; and

the amount of organic compound for covering said core metal is 0.01 to 1 molecule, per metal atom on said surface of said core metal.

7. A process for producing composite metallic ultrafine particles according to claim 5, characterized in that said organic compound includes an alcoholic hydroxyl group, carboxyl, thiol, amino, or amide group and has four or more carbon atoms.

8. A process for producing composite metallic ultrafine particles according to claim 5, characterized in that said metallic salt is carbonate, nitrate, chloride, acetate,

formate, citrate, oxalate, urate, phthalate, or a fatty acid salt having four or less carbon atoms.

9. A process for producing composite metallic ultrafine particles, characterized by comprising:

mixing a metallic salt, a metallic oxide, or a metallic hydroxide with an organic compound including a functional group having chemisorption capability onto a surface of a core metal produced from the metallic salt, the metallic oxide, or the metallic hydroxide; and

heating said mixture under a reflux condition of said organic compound for reaction.

10. A process for producing composite metallic ultrafine particles according to claim 9, characterized in that:

said core metal includes at least one member selected from the group consisting of Ag, Au, Bi, Co, Cu, Cr, Fe, Ge, In, Ir, Ni, Os, Pd, Pt, Rh, Ru, Si, Sn, Ti, and V; and

the amount of organic compound for covering said core metal is 0.01 to 1 molecule, per metal atom on said surface of said core metal.

11. A process for producing composite metallic ultrafine particles according to claim 9, characterized in that said organic compound includes an alcoholic hydroxyl group, carboxyl, thiol, amino, or amide group and has four or more carbon atoms.

12. A process for producing composite metallic ultrafine particles according to claim 9, characterized in that said metallic salt is carbonate, nitrate, chloride, acetate, formate, citrate, oxalate, urate, phthalate, or a fatty acid salt having four or less carbon atoms.

13. A composite metallic ultrafine particle having a structure in which a periphery of a core metal having a diameter of 1 to 100 nm is surrounded by an organic compound including an alcoholic hydroxyl group.

14. A composite metallic ultrafine particle according to claim 13, characterized in that:

said core metal is at least one member selected from the group consisting of Cu, Ag, Au, In, Si, Ti, Ge, Sn, Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt, V, Cr, and Bi; and

said composite metallic ultrafine particle have a metal content of 50 to 95% by weight.

15. A composite metallic ultrafine particle according to claim 13, characterized in that said organic compound including an alcoholic hydroxyl group is a straight-chain or branched-chain alcohol having four or more carbon atoms, or an aromatic compound including a hydroxyl group.

16. A process for producing composite metallic ultrafine particles, characterized by comprising heating an organic compound including an alcoholic hydroxyl group and a metallic

salt as a metal source at a temperature that is not more than a decomposition initiation temperature of said organic compound including an alcoholic hydroxyl group and is not less than a decomposition temperature of said metallic salt.

17. A process for producing composite metallic ultrafine particles according to claim 16, characterized in that a metallic component in said metal source is at least one member selected from the group consisting of Cu, Ag, Au, In, Si, Ti, Ge, Sn, Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt, V, Cr, and Bi.

18. A process for producing composite metallic ultrafine particles according to claim 16, characterized in that said metallic salt is carbonate, nitrate, chloride, acetate, formate, citrate, oxalate, urate, phthalate, or a fatty acid salt having four or less carbon atoms.

19. A process for producing composite metallic ultrafine particles, characterized by comprising:

mixing an organic compound including an alcoholic hydroxyl group with a metallic salt as a metal source;

adding a reducing agent to said mixture; and

heating said mixture for reaction.

20. A process for producing composite metallic ultrafine particles according to claim 19, characterized in that a metallic component in said metal source is at least one member selected from the group consisting of Cu, Ag, Au, In, Si, Ti,

Ge, Sn, Fe, Co, Ni, Ru, Rh, Pd, Os, Ir, Pt, V, Cr, and Bi.

21. A process for producing composite metallic ultrafine particles according to claim 19, characterized in that said metallic salt is carbonate, nitrate, chloride, acetate, formate, citrate, oxalate, urate, phthalate, or a fatty acid salt having four or less carbon atoms.

22. A process for producing composite metallic ultrafine particles, characterized by comprising:

dissolving or dispersing a metal source in a hydrophilic nonaqueous solvent to prepare a solution for composite metallic ultrafine particles;

adding, to a hydrophobic nonaqueous solvent, an organic compound including a functional group having chemisorption capability onto a surface of a core metal produced from said metal source, and said solution for composite metallic ultrafine particles to prepare a precursor of ultrafine particles; and

adding a reducing agent to reduce said precursor of ultrafine particles.

23. A process for producing composite metallic ultrafine particles according to claim 22, characterized in that an antioxidant is added to said solution for composite metallic ultrafine particles to enhance the stability of a composite metallic ultrafine particle.

24. A process for producing composite metallic ultrafine particles according to claim 23, characterized in that said antioxidant is ascorbic acid or vitamin E.

25. A process for producing composite metallic ultrafine particles according to claim 22, characterized in that said metal source is at least one member selected from the group consisting of inorganic metallic salts and organometallic compounds.

26. A process for producing composite metallic ultrafine particles according to claim 22, characterized in that said hydrophilic nonaqueous solvent is a ketone or an alcohol having five or less carbon atoms.

27. A process for producing composite metallic ultrafine particles according to claim 22, characterized in that said organic compound including a functional group having chemisorption capability onto a surface of said core metal is at least one member selected from the group consisting of higher alcohols having six or more carbon atoms and surface-active agents.

28. A process for producing composite metallic ultrafine particles according to claim 22, characterized in that:

citric acid or ascorbic acid is used as said reducing agent; and

the system is gradually heated to a temperature at which

a reduction action is developed.

29. A process for producing composite metallic ultrafine particles according to claim 22, characterized in that said core metal includes at least one member selected from the group consisting of Ag, Au, Bi, Co, Cu, Cr, Fe, Ge, In, Ir, Ni, Os, Pd, Pt, Rh, Ru, Si, Sn, Ti, and V.

30. A process for producing composite metallic ultrafine particles according to claim 22, characterized in that said hydrophobic nonaqueous solvent is at least one member selected from the group consisting of petroleum hydrocarbons and terpenes.

31. An apparatus for forming an interconnection, characterized by comprising:

a loading/unloading section having an inlet/outlet port;

a dispersion liquid supply device for supplying a dispersion liquid of composite metallic ultrafine particles to a surface of a substrate, said dispersion liquid of composite metallic ultrafine particles being prepared by dispersing, in a predetermined solvent, said composite metallic ultrafine particles in which a surface of a core metal is covered with an organic compound including a functional group having chemisorption capability onto said surface of said core metal;

a heating device for heating said substrate to melt the metal particles and bond them to each other;

a polishing device for polishing the surface of said

substrate to remove an excessively deposited metal, and

a cleaning/drying device for cleaning and drying the polished substrate.

32. An apparatus for forming an interconnection according to claim 31, characterized by further comprising a supplementary drying device for drying a solvent contained in said dispersion liquid of composite metallic ultrafine particles which has been supplied to said surface of said substrate.

33. An apparatus for forming an interconnection according to claim 31, characterized by further comprising a bevel/backside cleaning device for cleaning a peripheral portion and/or a backside surface of said polished substrate.

34. An apparatus for forming an interconnection according to claim 31, characterized by comprising a sensor for measuring a film thickness in at least one of times after evaporation of a solvent contained in said dispersion liquid of composite metallic ultrafine particles which has been supplied to said surface of said substrate, after a heating process in said heating device, and during or after a polishing process in said polishing device.

35. An apparatus for forming an interconnection according to claim 34, characterized in that said sensor for measuring a film thickness is provided in a substrate holding

portion in a substrate transfer device for transferring a substrate.

36. An apparatus for forming an interconnection according to claim 31, characterized in that:

pressures in an indoor facility are respectively controlled in a cleaning division having said loading/unloading section and a cleaning/drying section housing said cleaning/drying device, and a treatment division having a dispersion liquid supply section having said dispersion liquid supply device therein, a heating section housing said heating device, and a polishing section housing said polishing device; and

a pressure in said cleaning division is controlled so as to be higher than a pressure in said treatment division.

37. A method for forming an interconnection, characterized by comprising:

providing a substrate having a fine cavity formed on a surface of said substrate;

supplying a dispersion liquid of composite metallic ultrafine particles to said surface of said substrate, said dispersion liquid of composite metallic ultrafine particles being prepared by dispersing, in a predetermined solvent, said composite metallic ultrafine particles in which a surface of a core metal is covered with an organic compound including a functional group having chemisorption capability onto said surface of said core metal;

heating said substrate to melt the metal particles and bond them to each other;

polishing said surface of said substrate to remove an excessively deposited metal; and

cleaning and drying the polished substrate.

38. A method for forming an interconnection according to claim 37, characterized in that a solvent contained in said dispersion liquid of composite metallic ultrafine particles is evaporated after said dispersion liquid of composite metallic ultrafine particles is supplied to said surface of said substrate and before said substrate is heated.

39. A method for forming an interconnection according to claim 38, characterized in that a film thickness is measured in at least one of times after evaporation of a solvent contained in said dispersion liquid of composite metallic ultrafine particles which has been supplied to said surface of said substrate, after a heating process of said substrate, and during or after a polishing process of said substrate.

40. A method for forming an interconnection according to claim 39, characterized in that the amount of said dispersion liquid of composite metallic ultrafine particles to be supplied to said surface of said substrate is controlled based on measurement results of said film thickness.